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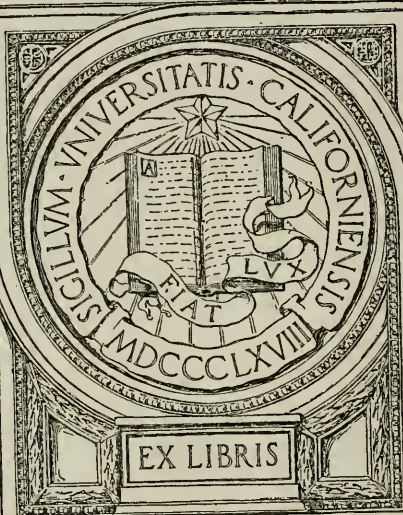
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# EDUCATION AND FECUNDITY

BY

NELLIE SEEDS NEARING

## ABSTRACT OF THESIS

PRESENTED TO THE FACULTY OF THE GRADUATE SCHOOL IN  
PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR  
THE DEGREE OF DOCTOR OF PHILOSOPHY

REPRINT FROM PUBLICATION OF AMERICAN  
STATISTICAL ASSOCIATION  
JUNE, 1914

CHAUTAUQUA PRINT SHOP  
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## I. THE INCREASE IN THE HIGHER EDUCATION OF WOMEN.

In the effort to analyze a popular prejudice or fallacy, an adequate investigation of facts is usually sufficient to reveal the origin of such prejudice in previously existing conditions which have altered so gradually with time, that society as a whole has hardly yet become aware of the change. In such a category we might include many of the fallacies concerning the position and faculties of women.

A hundred years ago, the higher education of women was an unheard of phenomenon. Women were intended to bear children. What need had they of an education! Marriages were then contracted at an early age, usually in the teens or early twenties, and as an advanced education precluded the possibility of an early marriage, it seemed to preclude possibility of marriage at all.

The average woman, therefore, who went to college in the early days of college training for women, was not the type who would have been apt to marry in any case. The first classes of college women consisted largely of the woman who had some special talent which she wished to develop and practice, the woman of strong intellectual proclivities, who preferred not to engage in the domestic occupations usually relegated to women, and the woman who, because of personal unattractiveness, knew or feared her lack of popularity among men.

The later experiences of women's colleges are quite the opposite of those early encountered. Today it is the normal, not the unusual girl who goes to college or technical school. College education is considered generally desirable as a means of finishing the education of the average woman. It gives culture. It has become a common comfort, if not a necessity, for young women of means.

The developments of the last twenty years have placed before the parents of all classes a powerful incentive to give their daughters the best in education that can be secured. Are parents today recognizing these facts and educating their daughters as well as their sons? What are the facts? After they have been

ascertained, the second question may be asked—Does this increase of education have any appreciable effect upon fecundity?

The facts point conclusively to a rapid advance in the higher education of women. In the first place a larger number of girls than of boys are being given a high school education in the cities of the United States. Among 318 cities of the United States, 132 having 25,000 population and over, 186 having less than 25,000 population, twenty report more boys than girls in the fourth year of the high school. These twenty, moreover, are small and comparatively unimportant. In all the other 298 cities the number of girls is uniformly greater than that of boys.\*

Although the number of girls in the high schools almost universally exceeds the number of boys, the situation in the elementary grades is the reverse. A school census of thirty-two states (1911) shows that in only one state—New Hampshire—were there more girls than boys in all grades of the schools†. In only eight out of these thirty-one states, however, did the difference between the number of boys and number of girls exceed 10,000. The school system in its entirety contains a higher proportion of boys than of girls. It is only in the high school grades that the number of girls exceeds the number of boys. Clearly then, girls are availing themselves more fully of the public higher educational opportunities than are boys.

The real extent of the entrance by women into the fields of higher education is shown by a study of the statistics of college students. The movement toward the college education of women is so recent, and the opportunities for such education so much smaller than for that of men, that some years must still elapse before the absolute number of girls in college approaches the absolute number of boys there. The vital question therefore is the rate of increase in the number of women attending college each year and the rate of increase in the number of men. The figures are available between 1889-1912 for the number of men and women in colleges of the United States.\* A comparison of

\* Age and grade census of Schools and Colleges, G. D. Straker, United States Bureau of Education Bulletin 1911, No. 5, pp. 14-28.

† Report of United States Commissioner of Education, 1911-1912, Government Printing Office, 1913 Vol. 2, p. 93.

these figures, first by ten year periods, then for the total period, shows that the ratio of increase is far greater for the women than for men.

TABLE I.  
PER CENT. OF INCREASE IN THE NUMBER OF MEN AND WOMEN IN THE  
COLLEGES OF THE UNITED STATES, 1889-1912.

| Period.                     | Men. | Women. |
|-----------------------------|------|--------|
| 1890-1891 to 1900-1901..... | 64   | 77     |
| 1900-1901 to 1910-1911..... | 58   | 66     |
| 1889-1890 to 1911-1912..... | 179  | 248    |

A further examination of the figures shows that the proportion of men to the total number of college students is steadily decreasing, and inversely the proportion of women steadily increasing.

TABLE II.  
PROPORTION OF MEN IN COLLEGE TO TOTAL COLLEGE STUDENTS,  
1889-1912.

| Period.        | Per Cent. |
|----------------|-----------|
| 1890-1891..... | 68        |
| 1900-1901..... | 66        |
| 1910-1911..... | 64        |
| 1911-1912..... | 63        |

Here then is an answer to the first question regarding the higher education of women. The number of women in the United States receiving higher education is absolutely and relatively increasing in the colleges, while in the high schools the number of girl students actually exceeds the number of boy students. What effect, if any, has this general entrance of women into the fields of higher education upon the marriage and birth rates of the women? An answer, scientifically established, will put to rest popular prejudice and speculative theory.

\*Total number of men and women in the colleges of the United States, 1889-1912. Report of the Commissioner of Education, 1911-1912, Government Printing Office, 1913, Vol. 2, p. 249.

|                |         |        |
|----------------|---------|--------|
| 1889-1890..... | 44,926  | 20,874 |
| 1890-1891..... | 46,220  | 22,036 |
| 1900-1901..... | 75,472  | 38,900 |
| 1910-1911..... | 119,020 | 64,546 |
| 1911-1912..... | 125,750 | 72,703 |

## II. MARRIAGE RATES OF EDUCATED WOMEN.

Marriage is the first element in fecundity which must be considered and investigated. Illegitimate births are few among the educated classes, and the statistics of such births even in the population at large, never exact, probably do not even approximate the truth. Hence this discussion will ignore the whole question of illegitimacy, and consider marriage as the necessary precursor to motherhood.

The method adopted in obtaining the statistics of marriage among college women was as follows: From a list of all the colleges in the United States, classified according to states, in the report of the United States Commissioner of Education for 1911-1912, showing in all 459 colleges having women students, seventy-two colleges were selected from twenty-eight states, an effort being made to select those having the largest number of women students. The women in these colleges are representative, both territorially and numerically, of the college women of the United States. The colleges were selected from various localities. The total number of women students in these seventy-two colleges was 40,653 or 36 per cent. of the total number of women college students in the United States.

A form letter was written to the registrar of each of these colleges asking for any vital statistics which had been collected, or which might be available in any form. Twenty-nine colleges replied that no such statistics were available, eighteen sent no reply, and twenty-five colleges sent such information as they had, which information in seven cases proved of no value. The material at hand was then carefully gone over and compiled into marriage rate and birth rate tables for each college.

The marriage tables for each college were then combined into two tables giving by decades first the number and second the per cent. of married and unmarried graduates from eighteen colleges having a total of 14,551 women graduates.

TABLE III.

\*NUMBERS OF WOMEN GRADUATES AND NUMBER OF SUCH GRADUATES MARRIED FOR CERTAIN COLLEGES, BY COLLEGE AND BY DECADES, 1870-1913.

| College.                   | 1870-79            |                 | 1880-89          |                 | 1890-99          |                 | 1900-09          |                 | 1910-12          |                 | Total to 1912     |                 |
|----------------------------|--------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|-------------------|-----------------|
|                            | * Number Graduate. | Number Married. | Number Graduate. | Number Married. | Number Graduate. | Number Married. | Number Graduate. | Number Married. | Number Graduate. | Number Married. | Number Graduate.  | Number Married. |
| Earlham .....              | 23                 | 13              | 43               | 33              | 132              | 80              | 200              | 103             | 15               | 10              | 473               | 239             |
| Swarthmore .....           | 31 <sup>4</sup>    | 21              | 72               | 42              | 148              | 86              | 260              | 103             | 109              | 4               | 620               | 262             |
| Wilson .....               | 36                 | 20              | 42 <sup>2</sup>  | 23              | 219              | 123             | 309              | 95              | 140              | 2               | 746               | 266             |
| Indiana .....              | 35                 | 30              | 56               | 40              | 228              | 120             | 482              | 164             |                  |                 | 887               | 366             |
| Vassar .....               | 383                | 203             | 376              | 208             | 791              | 120             | 1874             | 500             |                  |                 | 3424              | 1287            |
| Oregon .....               |                    |                 | 34               | 19              | 84               | 523             | 151              | 63              |                  |                 | 269               | 136             |
| Radcliffe .....            |                    |                 | 30               | 12              | 253              | 37              | 746              | 228             | 228              | 16              | 1257              | 376             |
| Wellesley .....            |                    |                 | 318              | 257             | 1201             | 123             |                  |                 |                  |                 | 1719              | 780             |
| S. Dakota .....            |                    |                 |                  | 47              | 3                | 733             | 33               | 23              | 5                | 153             | 84                |                 |
| Bryn Mawr .....            |                    |                 |                  | 294             | 158              | 688             | 244              | 8               |                  |                 | 1193              | 392             |
| Mississippi .....          |                    |                 | 12 <sup>5</sup>  | 7               | 10               | 48              |                  |                 |                  |                 | 70                | 18              |
| Holyoke .....              | †                  |                 |                  |                 | 377              |                 |                  |                 |                  |                 |                   |                 |
| Washington State .....     |                    |                 |                  |                 |                  |                 | 82               | 34              | 83               | 13              | 174               | 56              |
| Rochester .....            |                    |                 |                  |                 |                  |                 | 135 <sup>8</sup> | 30              |                  |                 | 135               | 40              |
| Ohio .....                 |                    |                 |                  |                 |                  |                 |                  |                 |                  |                 | 52                | 32              |
| Oregon Agri-cultural ..... |                    |                 |                  |                 |                  |                 |                  |                 |                  |                 | 398               | 206             |
| Rockford .....             |                    |                 |                  |                 |                  |                 |                  |                 |                  |                 | 237 <sup>6</sup>  | 134             |
| Smith .....                |                    |                 |                  |                 |                  |                 |                  |                 |                  |                 | 2161 <sup>6</sup> | 1016            |

TABLE IV.

PER CENT. OF WOMEN COLLEGE GRADUATES WHO MARRIED, FOR CERTAIN COLLEGES, BY COLLEGES AND BY DECADES, 1870-1913.

| College.                  | 1870-79 | 1880-89 | Per Cent. of Graduates Married |                   |         | Total Graduates to 1912 |
|---------------------------|---------|---------|--------------------------------|-------------------|---------|-------------------------|
|                           |         |         | 1890-99                        | 1900-09           | 1909-12 |                         |
| Earlham .....             | 56.9    | 76.7    | 60.6                           | 51.5              | 13.3    | 50.5                    |
| Swarthmore .....          | 67.7    | 58.3    | 58.7                           | 39.6              | 3.6     | 42.2                    |
| Wilson .....              | 55.5    | 54.7    | 56.1                           | 30.7              | 1.4     | 35.6                    |
| Indiana .....             | 85.7    | 71.4    | 55.2                           | 34.9              |         | 41.2                    |
| Vassar .....              | 53.0    | 55.3    | 47.5                           | 26.6              |         | 37.5                    |
| Oregon .....              |         | 55.8    | 64.2                           | 41.7              |         | 50.5                    |
| Radcliffe .....           |         | 40.0    | 47.4                           | 30.5              | 7.6     | 29.9                    |
| Wellesley .....           |         | 49.6    | 43.5                           |                   |         | 45.3                    |
| South Dakota .....        |         |         | 78.7                           | 21.7              |         | 54.9                    |
| Bryn Mawr .....           |         |         | 41.8                           | 35.4              |         | 32.8                    |
| Mississippi .....         |         | 58.3    | 30.0                           | 16.6              |         | 25.7                    |
| Holyoke .....             |         |         | 41.9 <sup>1</sup>              | 23.6 <sup>2</sup> |         |                         |
| Washington State .....    |         |         | 41.4                           |                   | 15.6    | 32.1                    |
| Rochester .....           |         |         |                                | 22.2              |         | 22.2                    |
| Ohio .....                |         |         |                                |                   |         | 61.5                    |
| Oregon Agricultural ..... |         |         |                                |                   |         | 51.7                    |
| Rockford .....            |         |         |                                |                   |         | 56.1                    |
| Smith .....               |         |         |                                |                   |         | 47.0                    |

\* Since 1873. <sup>2</sup> Since 1883. <sup>3</sup> Since 1901-10. <sup>4</sup> Since 1873. <sup>5</sup> Since 1885. <sup>6</sup> To 1901.  
 † Secured from an article by Amy Hewes, Quarterly Publication of American Statistical Association, Vol. XII, p. 771.

In only five cases were figures available for the decade 1870-79. In only nine cases were they available from 1880-89. In view of the fact, further, that the marriage rate of those graduating since 1900 would still necessarily be low because such graduates would be under 35 years of age, the most representative decade under consideration would be that from 1890-99. Here the absolute number of women graduates is greater than in any preceding decade, although less than in any succeeding decade. The per cent. of marriage here averages, on the whole, considerably lower than that of the previous decades in the colleges from which such information is available. It is probable, therefore, that the per cent. in this decade would give a conservative estimate of the rate for college women. It varies from 78.7 in South Dakota State College to 30 per cent. in the University of Mississippi—neither of these colleges being representative, graduating between them in the decade only 57 students. If we compare the per cent. for this decade with that of the following, we find an average fall of 20 while the average fall from the per cent. of 1900-09 to that which was estimated in a few cases for 1909-1912 was 25 per cent.

The totals are comparatively meaningless. This statement applies to both the absolute number and to the proportion of graduates married. Both the total number of graduates married in each college (and in some colleges this was the only information available), and the proportion married must be considered in view of the fact that the results are obtained from a body of students of whom a large number have yet had little opportunity for marriage, and whose marriage rate when estimated separately was from 20 to 25 per cent. lower than that in the previous decade. It must be remembered, moreover, that as each graduating class is in almost every case larger than the preceding one, the denominator of the fraction is every year being increased at a greater rate than the numerator. On the other hand, this marriage per cent. of the entire number of graduates of a college includes in the older colleges those who have graduated in the decades previous to 1890, and whose marriage rate averages, where figures are obtainable, over 15 per cent. higher in 1880-89 than in 1890-99 and

5 per cent. higher in 1870-79 than in 1880-89. Balancing off the 20 and 25 per cent. fall in the rate from 1890 to 1913, and 15 and 5 per cent. increase previous to 1890 and taking into account that the fall was for a far greater absolute number than the increase, because of the yearly increase in size of classes, we may assume that in cases where the marriage rate by classes was not obtainable, the rate for those graduating in the decade 1890-99 is at least 10 per cent. higher than the rate for the entire body of graduates.

The earliest years, as already indicated, are scarcely representative. Yet there seems to be little real difference between the percentages there and in later decades. Of the 9 colleges which supply us figures for the decade 1880-89, 2 show percentages of married graduates in excess of 70 per cent. In neither of these colleges was the total number of graduates large (Earlham 43, Indiana 56). The other 7 colleges report marriage rates varying less than 10 points. The 2 large colleges, Vassar and Wellesley (376 and 518 graduates respectively), report a marriage rate for the decade of 55.3 in the case of Vassar and 49.6 in the case of Wellesley. The decade 1890 to 1899 is undoubtedly the most fairly representative of any of the decades under consideration. On the one hand, it falls within the epoch which accepted College Education for women, and looked upon it as thoroughly respectable. On the other hand, the graduates in the latest graduating class (class of 1899) are now at least 35 years of age. The marriage record of the decade is therefore fairly complete. The 8 colleges graduating more than 100 students during the decade (Earlham, Swarthmore, Wilson, Indiana, Vassar, Radcliffe, Wellesley, and Bryn Mawr) show fairly uniform marriage rates, the lowest is Bryn Mawr, 41.8 per cent. (294 graduates), and the highest is Swarthmore, 58.7 per cent. (148 graduates). It is probable that the marriage rate for this decade is fairly representative of the tendency in the modern women's college world. Granted that this statement is accurate, it may be said that the proportion of women college graduates who marry is approximately one half (usually slightly over 50 per cent.).

The records of the succeeding decade show a heavy falling off in per cent. of women married. The women in the class of 1909

are approximately 25 years old. The marriage records are therefore incomplete and wholly unreliable. The proportion married for this decade is from one quarter to one third of the total graduates, and is therefore almost one half of the pupils reported for the previous decade.

This study was originally intended to study in three classes: (1) The college woman, (2) The normal school graduate, and (3) The commercial high school graduate, and to compare the marriage and birth rates prevailing among the three. With this end in view a form letter similar to that sent to the colleges was sent to leading high and normal schools throughout the country. Only six replies were received and in only 2 of these cases was any information vouchsafed. Obviously these figures were of no practical use.

The only other group educationally on a par with women college graduates, for whom statistics are obtainable, is the group of men college graduates. The *Yale Review* gives us the following marriage rate for Yale graduates:

TABLE V.  
PER CENT. OF YALE GRADUATES WHO WERE MARRIED, 1701-1886.

| Classes.        | Per Cent. Married |
|-----------------|-------------------|
| 1701-1791 ..... | 88.3              |
| 1797-1833 ..... | 78.8              |
| 1834-1849 ..... | 81.2              |
| 1849-1866 ..... | 81.3              |
| 1867-1886 ..... | 66.3              |

The figures for the classes 1867-1886 are the only ones in any way comparable with the figures for woman college graduates. Since the question of social standing did not enter into the marriage rate of college men during the earlier decades, their marriage rate for the earliest decades would be expected to be somewhat higher than that of college women.

The only remaining comparison to be made is that between the marriage rate of college women and the marriage rate of the population at large.

TABLE VI.

PER CENT. MARRIED.\* TOTAL NUMBERS AND PERCENTAGES OF WOMEN,  
15 YEARS OF AGE AND OVER, TOGETHER WITH THOSE WHO ARE  
MARRIED AND WHO ARE SINGLE, 1910.

|                                                   | Total.     |           | Married    |           | Single    |           |
|---------------------------------------------------|------------|-----------|------------|-----------|-----------|-----------|
|                                                   | Number.    | Per Cent. | Number.    | Per Cent. | Number.   | Per Cent. |
| Total:                                            |            |           |            |           |           |           |
| Native white .....                                | 30,047,325 | 100       | 21,045,983 | 70.0      | 8,933,170 | 29.7      |
| Native parentage .....                            | 15,523,900 | 100       | 10,842,998 | 69.8      | 4,644,122 | 29.9      |
| Native white, foreign or<br>mixed parentage ..... | 5,887,131  | 100       | 3,421,147  | 58.1      | 2,453,017 | 41.7      |
| Foreign-born white .....                          | 5,446,306  | 100       | 4,444,657  | 81.6      | 994,110   | 18.3      |
| Negro .....                                       | 3,103,344  | 100       | 2,269,066  | 73.1      | 823,996   | 26.6      |

Since the great majority of women college graduates are native-born, the only figures here with which comparison can be made are those referring to native whites of native parents. As authority for this assumption, I might quote an investigation covering 1,290 college graduates in which 705 replied, practically all of whom were native born:

83.3 per cent. had native American parents.

2.8 per cent. had foreign mother and native father.

3.5 per cent. had foreign father and native mother.

only 9.8 per cent. had both parents foreign born.

The following figures then stand contrasted:

*Women 15 Years and Over.*

*Per Cent. Married.*

(native white, native parents) . . . . 69.8 (figures taken 1910).

College graduates to 1913 . . . . . 42.2 (figures taken 1913).

In view of the fact that a small proportion of college graduates (about 15 per cent.) are of foreign or mixed parentage, and that the marriage rate for the population at large for native white women of foreign parentage is 58.1 per cent., hence lower than that for native white of native parentage, the 42.2 per cent of college graduates should really be compared with a figure obtained by including 15 per cent. of those with foreign or mixed parentage, thus lowering the rate slightly. In other words, if we add to the 15,525,900 of native white parentage 15 per cent. of the 5,887,131 of mixed parentage, or 883,069 and to the 10,842,998

\*Abstract of the Thirteenth Census.

married of native white parentage, 58 per cent. (the foreign parentage rate) of this 883,069, or 158,925, we get a total of 11,001,950 women married out of total 16,406,969. This would give a marriage per cent. of 67. We can then make our contrast between 67 per cent. for the whole population and 42.2 per cent. for college graduates.

These figures show that the marriage rate for non-college women is 59 per cent. higher than the rate for college women. This would seem on the face of it, to be a tremendous difference, but it cannot be attributed solely to the difference in education. There are two other factors that play a large part in the situation. First comes the financial situation. In the second place, social considerations are of the utmost importance in determining marriage and usually act in actual practice as deterrents rather than incentives. The standards of living among educated people are higher, and their requirements harder for the prospective husband to meet. These two factors might and do contribute toward the comparatively low marriage rate of college women.

No other available figures throw light on the marriage rate, actual or comparative, of college women. College women do marry, probably in fifty cases out of a hundred, given sufficient time out of college.

### III. BIRTH RATES OF EDUCATED WOMEN.

Like the statistics of marriage, the most satisfactory statistics of the birth rate among educated women are those of college graduates. Out of the 58 replies from the 71 colleges written to, only 5 vouchsafed any information from which a birth rate could be deduced. In addition, information concerning 4 other colleges was obtained indirectly. Thus the source from which the figures were drawn is small in comparison with the entire field. The colleges included in it are, however, the most representative of American colleges for women. The following table gives a number of the most pertinent facts about the birth rates of college women:

TABLE VII.  
MARRIAGE RATES AND BIRTH RATES OF COLLEGE GRADUATES

| College         | Time Covered | Number of Graduates | Married |          | Those Married Having One Child or More |          | Those Married Having Two Children or More |          | Those Married Having No Children |          | Absolute Number of Children | Number of Children per 100 Graduates |         |
|-----------------|--------------|---------------------|---------|----------|----------------------------------------|----------|-------------------------------------------|----------|----------------------------------|----------|-----------------------------|--------------------------------------|---------|
|                 |              |                     | Number  | Per Cent | Number                                 | Per Cent | Number                                    | Per Cent | Number                           | Per Cent |                             | Total                                | Married |
| Rockford .....  | 1870-1901    | 327                 | 134     | 56.5     | 97                                     | 72.3     | 71                                        | 52.9     | 37                               | 20.1     |                             |                                      |         |
| Smith .....     | 1870-1901    | 2,161               | 1,016   | 47.0     | 681                                    | 67.0     | 449                                       | 44.1     | 335                              | 32.9     | 1,285                       | 59.4                                 | 126.4   |
| Wellesley ..... | 1875-1901    | 1,864               | 840     | 45.0     |                                        |          |                                           |          |                                  |          |                             |                                      |         |
| Vassar .....    | 1867-1901    | 1,880               | 961     | 51.1     | 662                                    | 68.8     | 461                                       | 47.9     | 289                              | 30.0     | 1,579                       | 83.9                                 | 164.3   |
| Bryn Mawr ..    | 1890-1901    | 373                 | 178     | 47.7     | 125                                    | 69.0     | 95                                        | 53.3     | 53                               | 20.7     | 307                         | 82.4                                 | 172.4   |
| Holyoke .....   | 1890-1899    | 377                 | 158     | 41.9     |                                        |          |                                           |          |                                  |          | 288                         | 76.3                                 | 182.3   |
| Smith .....     |              |                     |         |          |                                        |          |                                           |          |                                  |          |                             |                                      |         |
| Bryn Mawr ..    |              |                     |         |          |                                        |          |                                           |          |                                  |          |                             |                                      |         |
| Vassar .....    |              |                     |         |          |                                        |          |                                           |          |                                  |          |                             |                                      |         |
| Wellesley ....  | 1870-1901*   | 7,660               | 3,594   | 47.0     | 2,464                                  | 68.5     | 1,665                                     | 46.3     | 1,130                            | 31.4     |                             |                                      |         |
| Wells .....     |              |                     |         |          |                                        |          |                                           |          |                                  |          |                             |                                      |         |
| Radcliffe ....  |              |                     |         |          |                                        |          |                                           |          |                                  |          |                             |                                      |         |
| Rockford ....   |              |                     |         |          |                                        |          |                                           |          |                                  |          |                             |                                      |         |
| Northwestern    |              |                     |         |          |                                        |          |                                           |          |                                  |          |                             |                                      |         |

\* Article of Mrs. Valentine in Smith Alumnae Quarterly, July, 1911, published by the Alumnae Association of Smith College.

From this table it appears that the per cent. of married college graduates having one or more children varies from 67 per cent. at Smith to 72.3 at Rockford College. In all cases the period covered is approximately the same (Bryn Mawr is the sole exception). In all cases the percentage by one or more children is remarkably uniform. The per cent. having two or more children varies from 44.7 at Smith to 53 at Bryn Mawr. The per cent. of married graduates having no children varies from 20.1 per cent. at Rockford to 32.9 per cent. at Smith. Thus we find the birth rate is lowest at Smith, highest at Rockford, with Bryn Mawr as a medium.

This table of marriage rates and birth rates gives the figures from approximately the beginning of each college down to 1901. In the case of Bryn Mawr and of Holyoke, however, the founding of them was at a much later date than that of the others. (Holyoke existed as a Seminary only, prior to 1890.) Since therefore neither of these colleges has the body of older graduates that the other colleges have, we should expect to find marriage and birth rates correspondingly lower. Since this is not the case in the birth rates at Bryn Mawr, we may assume a somewhat higher birth rate there in proportion to the other colleges, than is shown by the figures. Since the figures for the 8 colleges whose combined records appear show a slightly lower birth rate than the median taken from the entire table, we may assume a slightly lower rate for the colleges included in it, Wells, Radcliffe, Northwestern, whose separate figures were not obtainable, than for the colleges for which separate figures were secured.

A comparison of the absolute number of children in each case with the number of graduates in the 4 colleges from which these figures were obtainable, shows the following results: Smith 59.4, Vassar 83.9, Bryn Mawr 82.3, and Holyoke 76.3 children per 100 graduates. This rate apparently falls far short of properly maintaining the population. The small percentage of marriages among graduates, coupled with the low birth rate spells population decline. If, however, the matter is viewed from the standpoint of the married college graduate, the story is much better. A comparison of the number of married graduates with the number of

children gives the following result per one hundred married graduates: Smith 126.4, Vassar 164.3, Bryn Mawr 172.4, and Holyoke 182.3 children. These figures average about 1.6 children per married graduate.

TABLE VIII.  
MARRIAGE AND BIRTH RATES OF CERTAIN COLLEGES BY DECADES.

| Classes      | College         | Number of Graduates | Married |          | Total Number of Children | Number of Children per 100 Graduates | Number of Children per 100 Married Graduates |
|--------------|-----------------|---------------------|---------|----------|--------------------------|--------------------------------------|----------------------------------------------|
|              |                 |                     | Number  | Per Cent |                          |                                      |                                              |
| 1870 to 1879 | Vassar .....    | 383                 | 203     | 53.      | 422                      | 110.1                                | 207.8                                        |
|              | Bryn Mawr ..... |                     |         |          |                          |                                      |                                              |
|              | Wellesley ..... |                     |         |          |                          |                                      |                                              |
| 1880 to 1889 | Vassar .....    | 376                 | 208     | 55.3     | 348                      | 93.5                                 | 167.3                                        |
|              | Bryn Mawr ..... |                     |         |          |                          |                                      |                                              |
|              | Wellesley ..... | 518                 | 257     | 49—      | 427                      | 82.3                                 | 166.1                                        |
| 1890 to 1899 | Vassar .....    | 791                 | 376     | 47.5     | 553                      | 69.9                                 | 147.0                                        |
|              | Bryn Mawr ..... | 294                 | 123     | 41.8     | 211                      | 71.7                                 | 171.5                                        |
|              | Wellesley ..... | 1,201               | 523     | 43.5     | 776                      | 64.6                                 | 110.1                                        |
|              | Holyoke .....   | 377                 | 158     | 41.9     | 288                      | 76.3                                 | 182.3                                        |
| 1900 to 1909 | Vassar .....    | 1,874               | 500     | 26.6     | 344                      | 18.3                                 | 68.8                                         |
|              | Bryn Mawr ..... | 688                 | 244     | 35.4     | 189                      | 27.6                                 | 77.4                                         |
|              | Wellesley ..... |                     |         |          |                          |                                      |                                              |
|              | Holyoke .....   | 1,206               | 285     | 23.6     | 260                      | 21.5                                 | 91.2                                         |

It is apparent that not even in the decade 1870-79 was the birth rate high enough to maintain the population, when both the unmarried graduates and the husbands of the married graduates are taken into account. The rate in the next two decades declines for Vassar and Smith to 92.5 and 82.4 children respectively per 100 graduates. In the following decade these two colleges decline to 69.9 and 64.6 respectively, but Bryn Mawr and Holyoke here begin their existence, and their rates for the classes of this decade are slightly higher than the two others. In the decade 1900-1909 the rate is very low owing to recent graduation, and the figures are not worth consideration.

Only 2 colleges (Vassar and Bryn Mawr) give any detailed information regarding the size of families. Of these colleges, Vassar alone has been in existence long enough to show any marked change in family size.

TABLE IX.  
SIZE OF FAMILIES OF WOMEN COLLEGE GRADUATES.

| College and Period | Total Married Graduates | Number of Married Graduates Having Each of the Following Number of Children |     |       |      |      |     |       |       | Total Children |
|--------------------|-------------------------|-----------------------------------------------------------------------------|-----|-------|------|------|-----|-------|-------|----------------|
|                    |                         | One                                                                         | Two | Three | Four | Five | Six | Seven | Eight |                |
| Vassar:            |                         |                                                                             |     |       |      |      |     |       |       |                |
| 1867-1901.....     | 961                     | 201                                                                         | 209 | 143   | 61   | 29   | 11  | 6     | 2     | 289            |
| 1867-1910.....     | 1,323                   | 316                                                                         | 244 | 146   | 61   | 29   | 11  | 6     | 2     | 503            |
| Bryn Mawr:         |                         |                                                                             |     |       |      |      |     |       |       |                |
| 1890-1912.....     | 380                     | 86                                                                          | 84  | 47    | 14   | 11   | 3   |       |       | 135            |
| Vassar:            |                         |                                                                             |     |       |      |      |     |       |       |                |
| 1867-1876.....     | 181                     | 24                                                                          | 26  | 35    | 20   | 14   | 5   | 2     | 1     | 383            |
| 1877-1886.....     | 207                     | 33                                                                          | 40  | 33    | 17   | 7    | 5   | 3     | 1     | 374            |
| 1887-1896.....     | 273                     | 57                                                                          | 74  | 44    | 17   | 8    |     |       |       |                |
| 1897-1901.....     | 276                     | 87                                                                          | 69  | 31    | 17   |      |     |       |       |                |

It will here be seen in the case of Vassar that the size of families has been smaller since 1901 than previous to that date. No Vassar graduate since that date has had a family of over three children, and only three have had a family of three. Vassar graduates since 1890 have had no families of six, six families of five, and eighteen families of four children each. The figures of Bryn Mawr, therefore, while they seem lower on the table, are really not so for the same period of years.

The last table which seems of value is published in the Bryn Mawr catalogue for 1913, page 298.

TABLE X.  
NUMBER OF MARRIAGES AMONG BRYN MAWR GRADUATES AND NUMBER  
OF CHILDREN BORN, BY YEAR OF MARRIAGES, 1890-1912.

| Year of<br>Marriage | Duration of Mar-<br>riage in<br>Years | Number of Gradu-<br>ates Mar-<br>ried Each<br>Year | Number of Children |       |       | Average<br>per<br>Marriage |
|---------------------|---------------------------------------|----------------------------------------------------|--------------------|-------|-------|----------------------------|
|                     |                                       |                                                    | Boys               | Girls | Total |                            |
| 1890.....           | 22-23                                 | 1                                                  | 1                  | 2     | 3     | 3.0                        |
| 1891.....           | 21-22                                 | 4                                                  | 5                  | 5     | 10    | 2.5                        |
| 1892.....           | 20-21                                 | 2                                                  | 0                  | 3     | 3     | 1.5                        |
| 1893.....           | 19-20                                 | 3                                                  | 6                  | 8     | 14    | 4.7                        |
| 1894.....           | 18-19                                 | 5                                                  | 5                  | 4     | 9     | 1.8                        |
| 1895.....           | 17-18                                 | 9                                                  | 7                  | 9     | 16    | 1.8                        |
| 1896.....           | 16-17                                 | 3                                                  | 6                  | 2     | 8     | 2.7                        |
| 1897.....           | 15-16                                 | 4                                                  | 7                  | 3     | 10    | 2.5                        |
| 1898.....           | 14-15                                 | 5                                                  | 12                 | 9     | 21    | 4.2                        |
| 1899.....           | 13-14                                 | 14                                                 | 6                  | 10    | 16    | 1.1                        |
| 1900.....           | 12-13                                 | 12                                                 | 14                 | 14    | 28    | 2.3                        |
| 1901.....           | 11-12                                 | 13                                                 | 18                 | 14    | 32    | 2.5                        |
| 1902.....           | 10-11                                 | 10                                                 | 13                 | 8     | 21    | 2.1                        |
| 1903.....           | 9-10                                  | 15                                                 | 11                 | 15    | 26    | 1.7                        |
| 1904.....           | 8-9                                   | 23                                                 | 31                 | 32    | 63    | 2.7                        |
| 1905.....           | 7-8                                   | 29                                                 | 29                 | 24    | 53    | 1.8                        |
| 1906.....           | 6-7                                   | 36                                                 | 23                 | 34    | 57    | 1.6                        |
| 1907.....           | 5-6                                   | 29                                                 | 18                 | 17    | 35    | 1.2                        |
| 1908.....           | 4-5                                   | 30                                                 | 22                 | 11    | 33    | 1.1                        |
| 1909.....           | 3-4                                   | 28                                                 | 16                 | 18    | 34    | 1.2                        |
| 1910.....           | 2-3                                   | 31                                                 | 3                  | 15    | 18    | 0.6                        |
| 1911.....           | 1-2                                   | 34                                                 | 8                  | 6     | 14    | 0.4                        |
| 1912.....           | Under 1                               | 52                                                 | 0                  | 0     | 0     | 0.0                        |
| 1890 to 1912....    |                                       | 392                                                | 261                | 263   | 524   | 1.3                        |

We here have an opportunity for the first time to compare the number of children with the duration of the marriage. The average number of children per family of ten or more years' duration is 2.7, showing a rate slightly higher than that necessary to maintain a static population, provided no deaths occur. Holyoke gives a similar figure here, showing an average of 2.43 children born to each of 439 married graduates of the decade 1890-99.

Available figures dealing with the fecundity of college women are few in number and narrow in scope—the same data are not given in every case, and comparison is difficult. Figures for the past deal with the number of graduates having children, rather than the number of children, hence the difficulty of showing accurate details of the number of children per marriage. Since in each case, of the five colleges furnishing the best data, Bryn Mawr was nearest to the medium, her figures can reasonably be assumed to represent the approximate situation in those colleges not giving complete data (Smith and Rockford). Since further, the

Bryn Mawr table for duration of marriage shows that all marriages of over ten 'years' duration average 2.7 children, the following conclusion may be drawn:

1. Where all college graduates are included up to date the number of children per graduate would be slightly above three fourths, the number per married graduate would be approximately one and one half.

2. Where only those graduates who have been graduated a sufficient number of years to allow for marriage and all probable family increase, are considered, the rate would be approximately 2 to  $2\frac{1}{2}$  children per family.

So much for the available figures for college graduates. Of all possible comparisons, the fairest, in fact the only fair comparison, is with the sisters, cousins, and friends of these college women, who did not themselves attend college. Here social and economic considerations would have equal weight, and any difference in rate would most probably be traceable to the college training.

Mary Roberts Smith in an article on the Statistics of College and Non-College Women (1900)\* has made such a study and obtained from it valuable conclusions. Schedules were sent by her to 343 college mothers and 313 non-college mothers who were their sisters, cousins, and friends. She summarizes her conclusions as follows:

1. The marriage of college women was postponed two years as compared with that of non-college women (26.3 vs. 24.3 years.)

2. The age of marriage for both classes has been growing in the last thirty years,—a larger per cent. of non-college mothers marrying before the age of 21; a larger per cent. of the college mothers marrying after 34.

3. The non-college women have been married an average of 2 years longer than the college women and have borne a slightly larger number of children, but the college women have borne the larger number of children per year of married life.

Significant comparison may be made between the men. If we

\*Quarterly Publications of the American Statistical Association, No. 49-50, Volume VII, March-June, 1900, p. 1.

compare the fecundity of Yale graduates to the fecundity of women college graduates, we get the following results.\*

TABLE XL.

A COMPARISON OF THE BIRTH RATES OF YALE AND VASSAR GRADUATES CLASSES OF 1867 TO 1886 INCLUSIVE. NUMBER OF CHILDREN PER MARRIED GRADUATE.

|                 |      |
|-----------------|------|
| Yale:           |      |
| 1867-1886 ..... | 2.02 |
| Vassar:         |      |
| 1867-1886 ..... | 1.95 |

Another interesting comparison might be made between women college graduates and women graduates of normal and high schools, who did not go to college, but here again it is rendered impossible by the fragmentary character of the material. Authoritative data was secured for only two classes and conclusions from them would carry little weight.

A comparison of college birth rates with those of the population at large are of little value because of the differences in age, sex, social and economic position. Moreover, statistics of the population at large in the United States have never been compiled. In the registration area, where some work has been done, imperfect registration of birth renders the figures of somewhat doubtful value.

One study, however, has been made which gives us comparable figures from the population at large. I refer to an article by Dr. Joseph A. Hill in the *QUARTERLY PUBLICATIONS OF THE AMERICAN STATISTICAL ASSOCIATION*.† Dr. Hill's study included in all 185,788 women, 78,432 of whom had been married ten to twenty years. These 78,432 were divided into four classifications: (1) white native parentage, (2) white foreign parentage (first generation), (3) (second generation), (4) negro. The areas covered were the state of Rhode Island, the City of Cleveland and 48 mainly rural counties in Ohio, Minneapolis, and 21 mainly rural counties in Minnesota. The native white of native parents are of

\*Statistics of Yale Graduates, *Yale Review*, 1908-09, p. 337.

†Quarterly Publications of the American Statistical Association, Vol. XIII, Dec. 1913, p. 583.

course the only ones that can fairly be compared with our college women. For them the figures were as follows:

TABLE XII.  
BIRTH RATE OF NATIVE-BORN WHITE AMERICAN WOMEN UNDER 45  
YEARS OF AGE, MARRIED 10-20 YEARS.

| Total<br>Number | Bearing No Children |           | Total<br>Number<br>of Children | Average<br>per<br>Married<br>Woman | Per Cent Bearing |           |                       |
|-----------------|---------------------|-----------|--------------------------------|------------------------------------|------------------|-----------|-----------------------|
|                 | Number              | Per Cent. |                                |                                    | 1 or 2           | 3, 4 or 5 | 6 or More<br>Children |
| 15,953          | 2,097               | 13.1      | 42,933                         | 2.7                                | 39.8             | 37.2      | 9.9                   |

The interesting fact here is that Dr. Hill's average number of children per married woman, 2.7, is identical with the 2.7 children which each Bryn Mawr marriage of over ten years duration averages. Here, at least, we find two groups of women, college, and selected from the population at large, identical as to age, race, and duration of marriage, who average the same number of children per marriage.

In conclusion we may say, first, that the birth rate of college women is ascertainable; second, that, in so far as it can be compared to that of the sisters, consins, and friends of college women, it is probably very little lower, or about the same, *i.e.*, the non-college woman has more children, but the college woman bears more per year of married life; third, if we compare it with that of men college graduates, we find only a slightly lower rate for the women; fourth, in comparing it with the only definite study so far discovered, of women from the population at large, of similar race, of child-bearing age, married ten to twenty years, we find almost completely identical figures. Obviously none of these comparisons are of great value. The numbers included are in most cases too small or the ground covered too limited to enable us to give the results any widespread application.

The purpose of this study, as stated in the introduction, was the answering of two definite questions: First, is the higher education of women absolutely and relatively increasing in this country? Second, has this increase, if there is any, an appreciable effect upon fecundity?

The first of these questions must be answered definitely in the

affirmative. A careful investigation of the figures at hand shows not only a larger absolute number of girls than of boys in the high schools of the United States, but a greater ratio of increase in college attendance for girls than for boys, and a steady increase in the proportion of women students to the entire body of college students.

The answer to the second question—Has this increase in the higher education of women any effect upon fecundity—is not so satisfactory. It has been found (1) that the proportion of women college graduates who marry is approximately one half (slightly over one half in most cases); (2) that the proportion of men college graduates who marry is somewhat higher; (3) that, comparing college women with the census figures of population at large, the marriage rate among non-college women is considerably higher (59 per cent.) than among college women; (4) that the higher marriage rate of men and non-college women (where it is higher) may quite conceivably be due to causes other than that of education.

The figures and conclusions obtained are, at best, inadequate. Obviously they fall far short of showing any appreciable effect of the higher education of women upon fecundity. The college statistics are accurate and reliable as far as they go, but there are too few colleges which keep any records of fecundity, and the greater part of the figures obtainable are too recent to be fairly representative of college fecundity. High and normal school statistics on the subject of fecundity are practically non-existent, and present a field of work which would adequately repay careful investigation. The figures do prove conclusively the impossibility of justifying any statement that the higher education of women does or does not lower fecundity.

As far as any positive conclusion is concerned, the figures only show the existence of two separate phenomena of continually increasing importance, which might, were all the facts of the case revealed, show a close inter-relation. Obviously the importance of investigating the facts and obtaining all possible information and statistics cannot be overestimated. The entire trend of our higher education of women should be, and I confidently believe will be determined in large measure by its effect upon fecundity.









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